

Transmission Data and Analysis: How Loose is the Connection?

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New Study of Transmission Data and Analysis tools

- Who?
 - EIA
 - DOE (Policy and Transmission)
 - FERC
- Objectives
 - Assess whether Official data and analysis tools are sufficient to answer leading policy questions
 - Identify how any gaps might be filled

Why the Interest in Transmission Now?

- Growth of Wholesale Power Trading
- FERC's Restructuring of Wholesale Power Markets
 - Open Access (FERC 888, in 1996)
 - Regional Transmission Organizations (FERC 2000)
 - Standard Market Design NOPR, 2002
- DOE, FERC and Congressional Concerns

Growth of Wholesale Trading

Electricity Market Trends (Billion kilowatthours)

	1995	1996	1997	1998	1999	2000	2001
Wholesale Trades (No PMs)	1,276	1,431	1,616	1,664	1,247	1,628	2,079
Wholesale Trades Total	1,276	1,431	1,616	1,664	1,985	4,655	6,465
Sum of Purchases by LSEs				1,716	1,776	1,772	1,775
Total Demand	3,031	3,116	3,159	3,240	3,332	3,437	3,329
% of Demand Met by Purchases				53%	53%	52%	
Wholesale trades as % of Demand	42%	46%	51%	51%	60%	135%	194%
Wholesale trades as % of LSE Purchases				97%	112%	263%	364%

FERC's Restructuring Strategy Depends on Transmission

- Open Access for generator competition
 - More transmission, more competition
 - Larger areas, more competition
- Locational Pricing and CRRs to manage congestion
 - Visible pricing of transmission constraints
 - Values transmission hedges
- Regional Approach to Investment

Government Concern: the Grid may not be up to new Roles

- DOE, National Grid Study, May 2002
...the U.S. transmission system is in urgent need of modernization. The system has become congested because growth in demand...has not been matched by investment in new transmission facilities
- FERC found (New Release, July 31, 2002)
A decade of under-investment ...in needed transmission, generation siting in locations far from customers,...discriminatory behavior by transmission providers

Study Approach

- List major policy issues
- Identify and evaluate official data that addresses factual basis of policy concern
- Assess how well analytical tools, including models, answer questions that data does not
- Specify data and analytical tools necessary to better answer questions

A Point of View

- Data show what has occurred
- Models show what can occur under hypothetical conditions
- Both are needed to answer most policy questions
- Neither can be considered in isolation: data availability constrains models, theory and modeling technology determine what data is meaningful

Current Policy Questions (7)

- What are the grid's physical capabilities?
- Are generators connecting to the grid and securing access at reasonable prices?
- Is the grid operated economically, efficiently?
- Are wholesale markets Competitive?
- Is the Grid reliable?

Policy Questions (Continued)

- Is the grid supporting growth? Is transmission capability expanded when economic?
- Who pays unallocated costs, who benefits?

Official Transmission Data

What	Who	Frequency	Location
1. Historical Load	FERC 714	Hourly	Service Area
	EI 411	Monthly	Nerc Region
	ISOs	Hourly	ISO
2. International Import/Export	DOE	Monthly	US Borders
3. Projected Load	EI 411	Monthly	Nerc Region
	NERC	Varies	Nerc Region
4. Physical Descriptions			
Existing Generators and Lines	EI 411/412	Annual	State, Place Name
New Lines	FERC 1, EI 412	Annual	Place Names
Projected Lines	EI 411/412	Annual	Place Names
5. Electrical Description			
Grid/Generators/Etc	FERC 715	Annual Snapshot	Bus
6. Operational			
Reliability	E1417R	As Occur	Areas
Congestion	ISOs	Hourly	Line Segment
TLRs	NERC	As Occur	Flowgate
Imports/Exports	ISOs	Hourly	Areas
7. Economic			
Uplift	ISOs	Hourly	Varies

Observations

- Physical and electrical data are out of “sync”- means that precise 3rd party models are not possible
- Investment data seriously incomplete: no metering, telemetry, computation,etc.
- ISO Operational data good, others minimal
- Transmission Market data is sparse

Congestion-One Example of Living with the Data

- Congestion refers to lines that are loaded to their limit. Results in out-of-merit dispatch (higher cost) and in some ISO's congestion charges
- FERC attempted to estimate national congestion charges
 - Price data poor outside of ISO's
 - Replacement cost not always available

Does Data Answer Market critical Questions?

- Do not seem to know, except for a few places, at a few times
 - How much it costs and how long does it takes to connect
 - How much generators pay to use grid
 - What wholesale prices, Spot prices, Congestion are
 - Grid's reliability
 - Who pays, who benefits.
- Know for sure
 - Bottlenecks, price differentials and controversy persist

Data Driven Modeling Choices

Grid Study: Simplified Model

- Highly aggregate physical network, generators, lines and load
- Assumed reference electrical flows possible under changed conditions
- Abstracted from voltage concerns

Bottlenecks (continued)

- CRA SMD Study: Baseline, business as usual, very hard to capture
 - Contingency limits
 - Actual tariffs
 - Actual price setting mechanism
- Tentative answers reflect data, computational and conceptual difficulties

Investment, Competition and Growth: Any Answers?

- Quantifying grid's ability to support regional growth appears difficult, expensive and error prone
- Calculating competitive prices and market boundaries doable, but controversial
- Quantitative conclusions about “adequacy” or return to investment are fragile

Project Milestones

- Independent Expert Review of Research Plan- April
- First Awful Draft- Late June
- Technical Workshops- July
- Recovery/Rewrite/Review-August/October
- Publication- December/ January